

WHAT IS CLAIMED IS:

1. A system for use by a PU (processing unit) in communicating externally in a symmetrical multiprocessor system,
5 comprising:

PU issue and control logic means;

PU data flow means interconnected to the PU issue and control logic means;

10 PU channel logic means interconnected to the PU issue and control logic means and the PU data flow means, wherein said PU channel logic means includes:

channel read data means and channel write data means interconnected between the PU data flow means and the PU channel logic means;

15 channel and data input and output port means interconnected to the PU channel logic means;

channel stall signal output means interconnected from the PU channel logic means to the PU issue command control logic means; and

20 channel instruction means interconnecting the PU issue and control logic means to the PU channel logic means.

2. The apparatus of claim 1, comprising in addition:

25 means for keeping track of the number of communications pending with said specified device; and

means for modifying further PU actions when the number of communications with said specified device reaches a given predetermined number.

3. The apparatus of claim 2 wherein the means for modifying PU action operates to prevent further communication with said specified device until the number of communications with said specified device is caused to be altered.

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4. The apparatus of claim 1, comprising in addition:

means for assigning a channel for communications with a given external device;

10 means for placing communications for said given external device in a given storage means;

means for tracking the number of communications, for a given one of read or write instructions, from a PU to a given external device in a given counter associated with said channel that has been assigned;

15 means for tracking the number of communications, for said given one of read or write instructions, to the PU from the given external device to alter the count in the counter in a direction opposite from the counter movement when said instructions are sent from the PU; and

20 means for validating data in said given storage means when the count for said channel is at a given value.

5. The apparatus of claim 1, comprising in addition:

25 means for maintaining a count of register inputs versus outputs; and

means for retrieving data as valid when the count is other than a given predetermined value.

6. The apparatus of claim 1, comprising in addition:

30 means for maintaining a count of register inputs versus outputs; and

means for preventing further writing of data into said register when the count reaches a given predetermined value.

7. A method of checking to see if unread data has been returned from an external device, comprising:

issuing a read channel count instruction; and

comparing the count returned with a predetermined value to ascertain if a read register contains unread data.

8. A method of ascertaining if there is previously unread data in a read channel, comprising:

issuing a read channel count instruction; and

retrieving data in the read channel when the count returned is a predetermined value.

9. The method of claim 8 wherein the channel being read is an accumulating channel, comprising:

retrieving all the data stored in the read channel when the channel is read; and

resetting a channel counter associated with said read channel to a predetermined value each time the channel is read.

10. A method of ascertaining the existence of data in a read channel that has not been previously read, comprising:

sending a channel count read instruction to a read channel counter; and

reading the data in that channel if the count returned is within a given range of counts.

11. A method of ascertaining that an external device has not read data in a write channel, comprising:

sending a channel count read instruction to a write channel counter; and

writing further data to that channel only if the count returned is within a given range of counts.

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12. A computer program product for ascertaining that an external device has not read data in a write channel, the computer program product having a medium with a computer program embodied thereon, the computer program comprising:

10 computer code for sending a channel count read instruction to a write channel counter; and

computer code for writing further data to that channel only if the count returned is within a given range of counts.

15 13. A computer program product for ascertaining the existence of data in a read channel that has not been previously read, the computer program product having a medium with a computer program embodied thereon, the computer program comprising:

20 computer code for sending a channel count read instruction to a read channel counter; and

computer code for reading the data in that channel if the count returned is within a given range of counts.

14. A microprocessor, comprising:

25 read channels;

write channels;

incoming data counting mechanisms for at least some of said read and write channels; and

30 instruction processing means responding to external device generated instructions requesting a determination of the count in said data counting mechanism of at least one of said write channel

and read channels having counting mechanisms.

15. A method of sending data to an external device, comprising:

5 sending data to a write channel via a write channel instruction;

 sending a channel count read instruction to a counter associated with said write channel; and

 ascertaining that a count indication returned is within a
10 predetermined range of values before sending more data to said write channel.

16. A method of receiving data from an external device, comprising:

15 retrieving data from a read channel via a read channel instruction;

 sending a channel count read instruction to a counter associated with said read channel; and

 ascertaining that a count indication returned is within a
20 predetermined range of values before attempting to retrieve more data from said read channel.

17. A computer program product for sending data to an external device, the computer program product having a medium with
25 a computer program embodied thereon, the computer program comprising:

 computer code for sending data to a write channel via a write channel instruction;

 computer code for sending a channel count read instruction to
30 a counter associated with said write channel; and

 computer code for ascertaining that a count indication

returned is within a predetermined range of values before sending more data to said write channel.

18. A computer program product for receiving data from an external device, the computer program product having a medium with a computer program embodied thereon, the computer program comprising:

computer code for retrieving data from a read channel via a read channel instruction;

10 computer code for sending a channel count read instruction to a counter associated with said read channel; and

computer code for ascertaining that a count indication returned is within a predetermined range of values before attempting to retrieve more data from said read channel.

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19. Apparatus for transmitting data between a PU and an external device, comprising:

a data storage register;

20 means, comprising a part of said register, operable to accumulate data received from multiple writes directed to said register; and

means, comprising a part of said register, operable to transmit all data accumulated in said register in response to a single received read instruction.